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## ABSTRACT

### APPARATUS AND METHOD OF VARYING FONT PARAMETERS

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The present invention discloses a user interface system which enables the parameters (eg character infilling, character colour, character opacity, colour saturation, etc) of a character font (or other image) to be selected in sequence. Of the maximum possible  
10 combination of selectable sequences, some are disabled in order to deliberately simplify the choice available to the user. The disablement is preferably selectively activatable to assist first time and new users but not inhibit experienced users. The characters (Figs. 1 and 2) are able to be generated on a conventional general purpose computer (100). The interface system is vendible as a computer program product.

15

The claims defining the invention are as follows:

1. A user interface system to allow a user to select sequential parameters in a selectable font system, said system comprising  $n$  possible selectable fonts,  $n$  being a positive integer, and disablement means to disable the selection of  $m$  of said fonts,  $m$  being a positive integer less than  $n$ .  
5
2. The user interface system as claimed in claim 1 wherein the population of  $m$  is selectable.  
10
3. The user interface system as claimed in claim 1 or 2 wherein said disablement means is selectively activatable.
4. The user interface system as claimed in any one of claims 1 to 3 wherein the selection of fonts is carried out by use of a genetic algorithm, the distortion of successive generations of fonts bred by said algorithm being summed to provide a fitness function to determine said selection.  
15
5. A user interface system substantially as herein described with reference to the drawings.  
20
6. A method of allowing a user to select sequential parameters in a selectable font system, said method comprising the steps of determining that some of the possible

selectable sequences do not comply with a subjective criterion, and disabling the selection of said some possible selectable sequences.

7. The method as claimed in claim 6 wherein the number of possible selectable sequences is n, the number of said same disabled sequences is m, m and n being positive integers with m being less than n, and comprising the further step of the value of m being adjustable.

8. The method as claimed in claim 6 or 7 comprising the further step of selectively activating said disabling selection.

9. The method as claimed in any one of claims 6 to 8 further comprising the step of selecting said fonts using a genetic algorithm, the distortion of successive generations of fonts bred by said algorithm being summed to provide a fitness function to determine said selection.

10. A method of allowing a user to select sequential parameters in a selectable font system, said method being substantially as herein described with reference to the drawings.

20

11. A computer program product to allow a user to select sequential parameters in a selectable font system, said product comprising disablement means to disable some of the possible selectable sequences, said disabled sequences not complying with a subjective criterion.

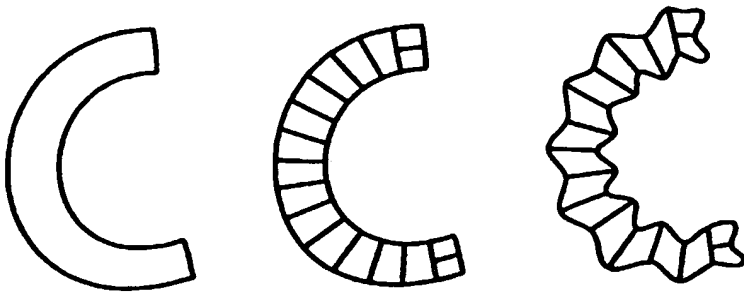


Fig. 1

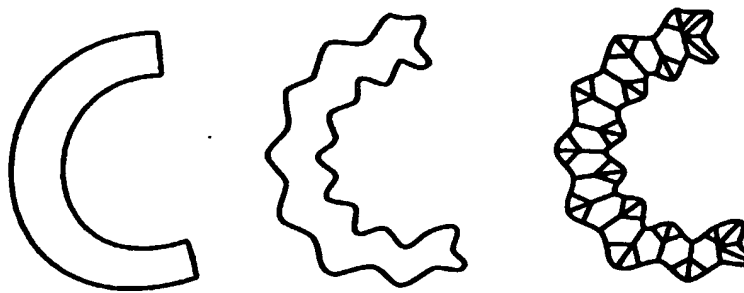


Fig. 2

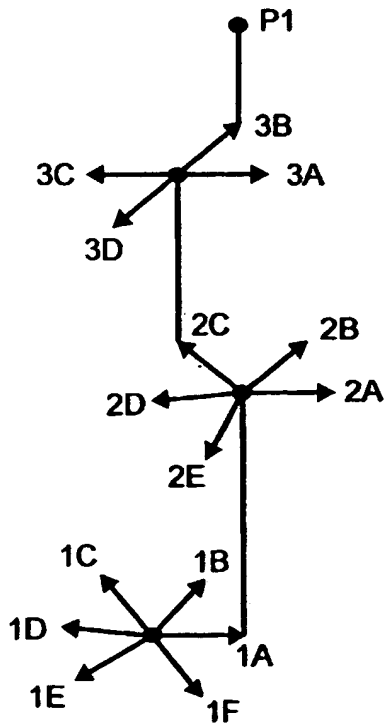


Fig. 3

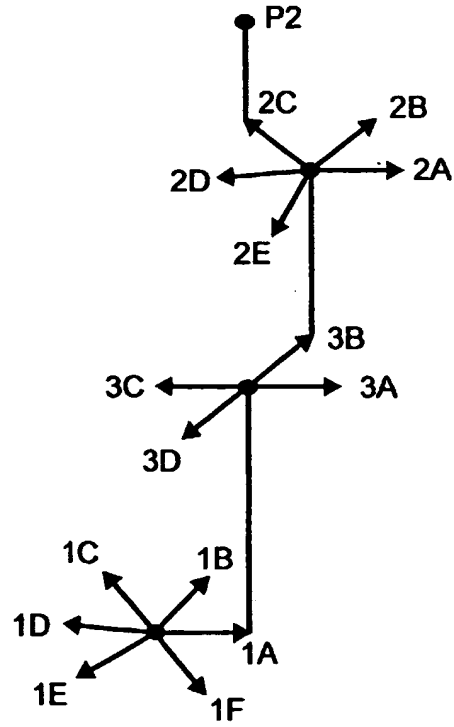


Fig. 4

**AUSTRALIA**

**PATENTS ACT 1990**

**COMPLETE SPECIFICATION**

**FOR A STANDARD PATENT**

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Invention Title: Apparatus and Method of Varying Font Parameters

**ASSOCIATED PROVISIONAL APPLICATION DETAILS**

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PP6256

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AU

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30 September 1998

The following statement is a full description of this invention,  
including the best method of performing it known to me/us:-

## **APPARATUS AND METHOD OF VARYING FONT PARAMETERS**

### **Field of the Invention**

The present invention relates to fonts and, in particular, to a user interface by means of which various parameters can be entered or modified so that a user can select  
5 and customise a particular font which appeals to the user. The present invention also relates to a font selection system, a method and a computer program product.

### **Background Art**

As graphical computer systems have become more complicated, the range of fonts and the range of graphical effects available to users has steadily increased.  
10 However, increasing choice does not necessarily represent increasing convenience since the user is presented with an often bewildering number of choices. Thus an increased time is required in evaluating the possibilities before finally selecting a choice.

### **Disclosure of the Invention**

The object of the present invention is to provide the user with a convenient  
15 means of making a rapid selection.

In accordance with one aspect of the present invention there is disclosed a user interface system to allow a user to select sequential parameters in a selectable font system, said system comprising  $n$  possible selectable fonts,  $n$  being a positive integer, and disablement means to disable the selection of  $m$  of said fonts,  $m$  being a positive  
20 integer less than  $n$ .

In accordance with another aspect of the present invention there is disclosed a method of allowing a user to select sequential parameters in a selectable font system, said method comprising the steps of determining that some of the possible selectable

sequences do not comply with a subjective criterion, and disabling the selection of said some possible selectable sequences.

In accordance with a still further aspect of the present invention there is disclosed a computer program product to allow a user to select sequential parameters in a selectable font system, said product comprising disablement means to disable some of the possible selectable sequences, said disabled sequences not complying with a subjective criterion.

Furthermore, a font resulting from any of the above is also disclosed.

#### **Brief Description of the Drawings**

10 An embodiment of the present invention will now be described with reference to the drawings in which:

Fig. 1 shows the result of a first font selection,

Fig. 2 shows the result of a second font selection,

Figs. 3 and 4 respectively diagrammatically illustrate the font selection of

15 Figs. 1 and 2 respectively,

Fig. 5 is a flow chart illustrating the implementation of the user interface, and

Fig. 6 is a schematic block diagram of a general purpose computer upon which the preferred embodiment of the present invention can be practised.

#### **Detailed Description including Best Mode**

20 Modern computer systems are intended to allow the user to select from a wide range of fonts, and graphical effects associated with fonts, in order to arrive at a desired selection. In addition to classical fonts such as Times Roman, Helvetia, etc various graphical effects are available such as the infilling of characters with various



surfaces, textures, images and the like and other similar graphical effects. This can present the user with a bewildering array of possible selections.

Fig. 1 represents the outcome of a first possible selection in which the initial selection or determining parameter is the skeleton or outline of the characters to  
5 comprise the font. In Fig. 1 only the character C is illustrated. The next choice for the user is one of a number of ways of modifying the basic character C and in the choice illustrated in Fig. 1 the user decides to infill the interior of the character with a series of substantially equally spaced lines which are drawn normal to the outline or exterior of the character. The result is as illustrated in the centre of Fig. 1.

10 Next the user decides to still further modify the font by applying a sinusoidal perturbation to the exterior of the character so as to produce the right hand character C in Fig. 1.

Fig. 2 illustrates the result of selecting the same parameters but in a different order. In the outcome illustrated in Fig. 2 the same initial character is selected as in  
15 Fig. 1, however, the sinusoidal perturbation of the outline of the character is selected as the second parameter, rather than the third as in Fig. 1. Finally, in Fig. 2 the infilling with lines normal to the exterior of the character is now carried out as the third step thereby resulting in a different filling pattern in Fig. 2 from that created in Fig. 1. It will be apparent from Figs. 1 and 2 that although the same font parameters have been  
20 selected, because they have been selected in a different sequence, the resulting font characters are different.

The two different sequence of events of Figs. 1 and 2 are graphically illustrated in Figs. 3 and 4. For the purpose of this embodiment it is assumed that for the first selection as to the basic outline of the character, the user is presented with six

choices which are graphically illustrated as vectors 1A-1F. The number of parameters available for the second selection in Fig. 1 is five and thus the possible selections are each illustrated graphically as vectors 2A-2E respectively. Finally, the third selection includes four possible parameters which are graphically represented as vectors 3A-3D.

5 From Fig. 3 it is apparent that by following the path 1A, 2C, 3B one arrives at a point P1 which is one point of a  $6 \times 5 \times 4 = 120$  point space.

As seen in Fig. 4, the selection carried out in Fig. 2 results in the vectors 1A, 3B, 2C being selected in that order and thereby results in a different point P2 in the 120 point space.

10 It will be apparent to those skilled in the art that the number of points in such a space rapidly increases with the number of parameters and the number of choices available for each parameter. Furthermore, the nature of the parameters differs. For example one parameter is "Should the interior of the character be filled?" which is essentially a digital parameter having two states either yes or no. Another parameter  
15 can be "What colour do you wish to select?" which enables selection of one colour of a large palette of colours. Similarly, the next parameter selected may relate to a property such as opacity, saturation or the like in which case the selected parameter can have a value between 0% and 100%, and so on.

The purchaser of a new suite of computer programs dealing with such fonts is,  
20 particularly during the initial period following the purchase, faced with an extremely large number of possible choices and wishes to be able to make initial selections rapidly in order to produce output, without unduly wasting time in selecting a particular combination of font parameters from the nearly infinite number made possible by modern computing techniques. Therefore in order to assist the user, the user interface

schematically illustrated in Fig. 5 is provided which essentially voids various possible choices on the basis that the computer program vendor knows in advance that some possible choices are unlikely to please most customers.

For example, in relation to Figs. 1 and 2, the computer vendor may be able to  
5 subjectively determine that the sequence illustrated in Fig. 1 will be aesthetically pleasing to most users whilst the sequence illustrated in Fig. 2 is likely not to find favour with users. As a consequence, in order to assist the user the computer program vendor disables point P2 in Fig. 4 and therefore prevents this particular sequence of parameters being selected.

10 As seen in Fig. 5, the user selects a first parameter from all the parameters available and then goes on to select the next parameter. If this parameter is part of a sequence of parameters which is not voided, the user is permitted to continue and selects the next parameter in the sequence and so on. However, as soon as the user selects a parameter which lies in one of the voided sequences, the user is asked to  
15 reselect the parameter on the basis that the user's selection is heading towards an aesthetically displeasing result. In this way the user is rapidly able to select a sequence of parameters, and then indicate that the last parameter has been selected in which case the computer is then able to calculate the selected font.

Naturally, the purchaser does not wish to be deprived of possible selections  
20 and therefore is provided with the option to remove the void check. If this option is selected then all options are able to be selected by the user.

Furthermore, given the perversity of human nature, some users will wish to select fonts which are deliberately gruesome, alarming, macabre or the like. Therefore in order to cater for such users, the essentially subjective criteria used in

determining whether a particular sequence should be voided are preferably able to be selected themselves. In this way users, instead of wasting time avoiding a macabre font, cannot waste time in selecting fonts which are not macabre.

For the computer supplier, there is a problem as to how to determine which  
5 fonts are to be voided. One, time consuming, way is to simply manually examine every possibility and form an entirely subjective judgement as to its fitness (or suitability).

However, it is not necessary to adopt this time consuming procedure. Instead the procedure can be largely automated by use of a genetic algorithm of the general  
10 type described, for example, in Sims K. "Artificial Evolution for Computer Graphics" Computer Graphics, Volume 25, Number 4, July 1991.

In utilising such a genetic algorithm the font parameters are equated with "genes" which are then "cross-bred" in order to create various possible combinations of parameters. The best two of these children are "chosen", for example either manually  
15 or by means of a fitness function, and bred again. This process quickly and automatically locates combinations with the desired "good" appearance. The automation can be enhanced by estimating the degree or amount of distortion for each child. A suitable fitness function is then to sum the distortion over all generations to arrive at an overall measure for the selected combination of parameters. A large  
20 measure of total distortion can be used to eliminate fonts if a "good" appearance is desired (this being equated with small distortions). The reverse applies if fonts of "good" appearance are to be eliminated.

The method of Fig. 5 is preferably practiced using a conventional general-purpose computer system 100, such as that shown in Fig. 6 wherein the processes of

Fig. 5 may be implemented as software, such as an application program executing within the computer system 100. In particular, the steps of the method of Fig. 5 are effected by instructions in the software that are carried out by the computer. The software may be divided into two separate parts; one part for carrying out the Fig. 5 methods; and another part to manage the user interface between the latter and the user. The software may be stored in a computer readable medium, including the storage devices described below, for example. The software is loaded into the computer from the computer readable medium, and then executed by the computer. A computer readable medium having such software or computer program recorded on it is a computer program product. The use of the computer program product in the computer preferably effects an advantageous apparatus for providing a user interface in accordance with the embodiments of the invention.

The computer system 100 comprises a computer module 101, input devices such as a keyboard 102 and mouse 103, output devices including a printer 115 and a display device 114. A Modulator-Demodulator (Modem) transceiver device 116 is used by the computer module 101 for communicating to and from a communications network 120, for example connectable via a telephone line 121 or other functional medium. The modem 116 can be used to obtain access to the Internet, and other network systems, such as a Local Area Network (LAN) or a Wide Area Network (WAN).

The computer module 101 typically includes at least one processor unit 105, a memory unit 106, for example formed from semiconductor random access memory (RAM) and read only memory (ROM), input/output (I/O) interfaces including a video interface 107, and an I/O interface 113 for the keyboard 102 and mouse 103 and optionally a joystick (not illustrated), and an interface 108 for the modem 116. A

storage device 109 is provided and typically includes a hard disk drive 110 and a floppy disk drive 111. A magnetic tape drive (not illustrated) may also be used. A CD-ROM drive 112 is typically provided as a non-volatile source of data. The components 105 to 113 of the computer module 101, typically communicate via an interconnected bus 104 and in a manner which results in a conventional mode of operation of the computer system 100 known to those in the relevant art. Examples of computers on which the embodiments can be practised include IBM-PC's and compatibles, Sun Sparcstations or alike computer systems evolved therefrom.

Typically, the application program of the preferred embodiment is resident on the hard disk drive 110 and read and controlled in its execution by the processor 105. Intermediate storage of the program and any data fetched from the network 120 may be accomplished using the semiconductor memory 106, possibly in concert with the hard disk drive 110. In some instances, the application program may be supplied to the user encoded on a CD-ROM or floppy disk and read via the corresponding drive 112 or 111, or alternatively may be read by the user from the network 120 via the modem device 116. Still further, the software can also be loaded into the computer system 100 from other computer readable medium including magnetic tape, a ROM or integrated circuit, a magneto-optical disk, a radio or infra-red transmission channel between the computer module 101 and another device, a computer readable card such as a PCMCIA card, and the Internet and Intranets including email transmissions and information recorded on websites and the like. The foregoing is merely exemplary of relevant computer readable mediums. Other computer readable mediums may be practiced without departing from the scope and spirit of the invention.

The method of providing a user interface may alternatively be implemented in dedicated hardware such as one or more integrated circuits performing the functions or sub functions of Fig. 5. Such dedicated hardware may include graphic processors, digital signal processors, or one or more microprocessors and associated memories.

5 **Industrial Applicability**

It is apparent from the above that the embodiment(s) of the invention are applicable to the computer graphics industry and to the font generation aspects thereof, in particular.

10 The foregoing describes only one embodiment of the present invention, and modifications and/or changes can be made thereto without departing from the scope and spirit of the invention, the embodiment being illustrative and not restrictive.

15 In the context of this specification, the word "comprising" means "including principally but not necessarily solely" or "having" or "including" and not "consisting only of". Variations of the word comprising, such as "comprise" and "comprises" have corresponding meanings.

The claims defining the invention are as follows:

1. A user interface system to allow a user to select sequential parameters in a selectable font system, said system comprising  $n$  possible selectable fonts,  $n$  being a positive integer, and disablement means to disable the selection of  $m$  of said fonts,  $m$  being a positive integer less than  $n$ .
2. The user interface system as claimed in claim 1 wherein the population of  $m$  is selectable.
3. The user interface system as claimed in claim 1 or 2 wherein said disablement means is selectively activatable.
4. The user interface system as claimed in any one of claims 1 to 3 wherein the selection of fonts is carried out by use of a genetic algorithm, the distortion of successive generations of fonts bred by said algorithm being summed to provide a fitness function to determine said selection.
5. A user interface system substantially as herein described with reference to the drawings.
6. A method of allowing a user to select sequential parameters in a selectable font system, said method comprising the steps of determining that some of the possible



selectable sequences do not comply with a subjective criterion, and disabling the selection of said some possible selectable sequences.

7. The method as claimed in claim 6 wherein the number of possible selectable sequences is n, the number of said same disabled sequences is m, m and n being positive integers with m being less than n, and comprising the further step of the value of m being adjustable.

8. The method as claimed in claim 6 or 7 comprising the further step of selectively activating said disabling selection.

9. The method as claimed in any one of claims 6 to 8 further comprising the step of selecting said fonts using a genetic algorithm, the distortion of successive generations of fonts bred by said algorithm being summed to provide a fitness function to determine said selection.

10. A method of allowing a user to select sequential parameters in a selectable font system, said method being substantially as herein described with reference to the drawings.

11. A computer program product to allow a user to select sequential parameters in a selectable font system, said product comprising disablement means to disable some of the possible selectable sequences, said disabled sequences not complying with a subjective criterion.

12. The computer program product as claimed in claim 11 wherein the number of possible selectable sequences is  $n$ , the number of said some disabled sequences is  $m$ ,  $m$  and  $n$  being positive integers with  $m$  being less than  $n$ , and including adjustment means  
5 for adjusting the value of  $m$ .

13. The computer program product as claimed in claim 11 or 12 including activation means connected to said disablement means to selectively activate same.

10 14. The computer program product as claimed in claims 11 to 13 including a genetic algorithm, and said disablement means utilises the distortion of successive generations of fonts bred by said algorithm being summed to provide a fitness function for said disablement means.

15 15. A computer program product to allow a user to select sequential parameters in a selectable font system, said product being substantially as herein described with reference to the drawings.

16. A font for use in a computer graphical display and/or printing system, said  
20 font being selectable from a plurality of sequentially selectable parameters via a user interface system as claimed in any one of claims 1 to 5.

17. A font selected by the method as claimed in any one of claims 6 to 10.

18. A font generated by a computer program product as claimed in any one of claims 11-15.

19. A character processing apparatus, comprising:

- 5       input means for inputting first parameter and second parameter;
- checking means for checking as to whether the second parameter input by said input means is valid or invalid; and
- means for re-inputting the second parameter when said checking means has checked said second parameter to be invalid, and for causing character generating
- 10       means to generate a character based on the first and the second parameters when said checking means has checked said second parameter to be valid.

20. A computer readable medium incorporating a computer program product having a series of instructions for character processing, said instructions comprising:

- 15       means for inputting first parameter and second parameter;
- means for checking as to whether the second parameter input by said input means is valid or invalid; and
- means for re-inputting the second parameter when said checking has checked said second parameter to be invalid, and for causing generation of a character based on
- 20       the first and the second parameters when said checking has checked said second parameter to be valid.

21. A method for character generation, said method comprising the steps of:

- inputting first parameter and second parameter;

checking as to whether the second parameter input by said input means is valid  
or invalid; and either

re-inputting the second parameter when said checking means has checked said  
second parameter to be invalid; or

5 generating a character based on the first and the second parameters when said  
checking means has checked said second parameter to be valid.

10

**Dated 2 August, 1999**  
**CANON KABUSHIKI KAISHA**  
Patent Attorneys for the Applicant/Nominated Person  
**SPRUSON & FERGUSON**

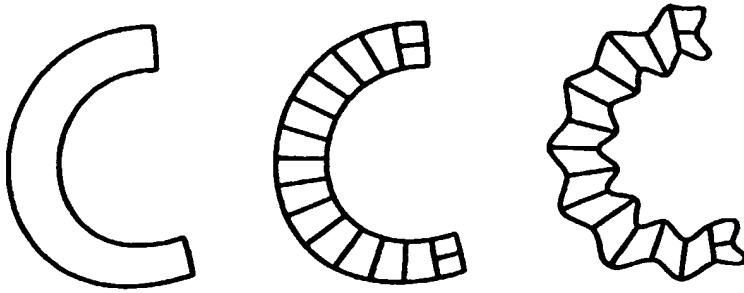


Fig. 1

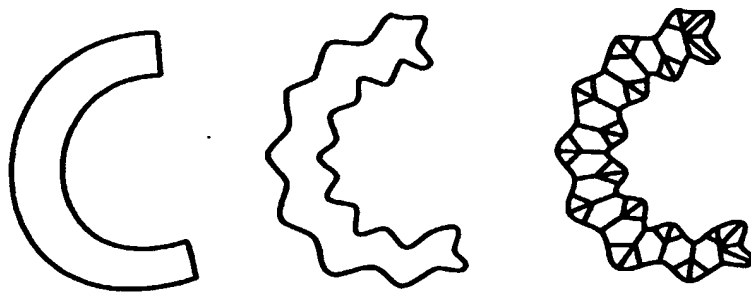


Fig. 2

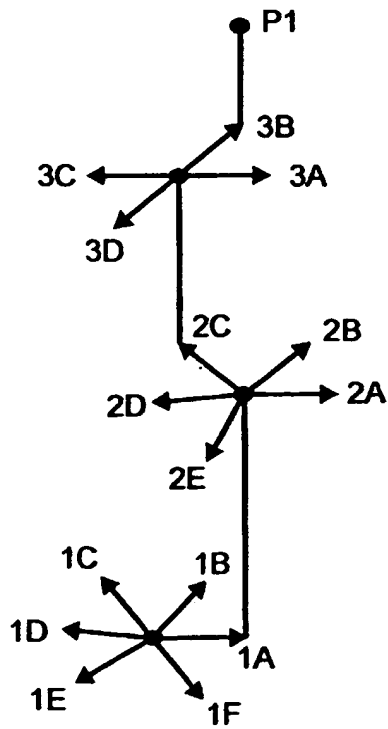


Fig. 3

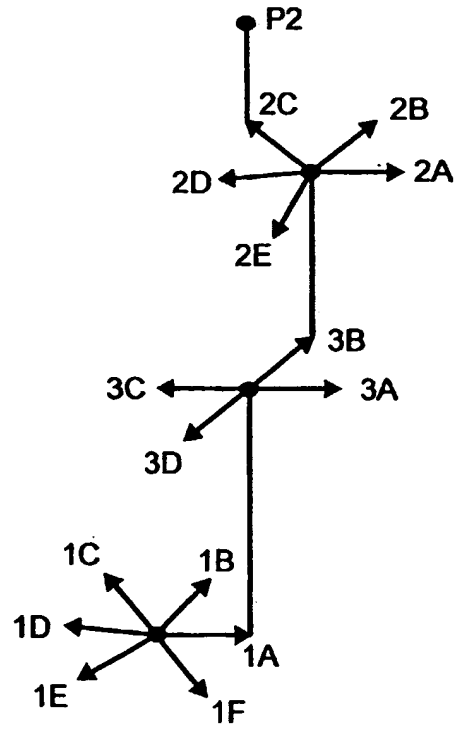


Fig. 4

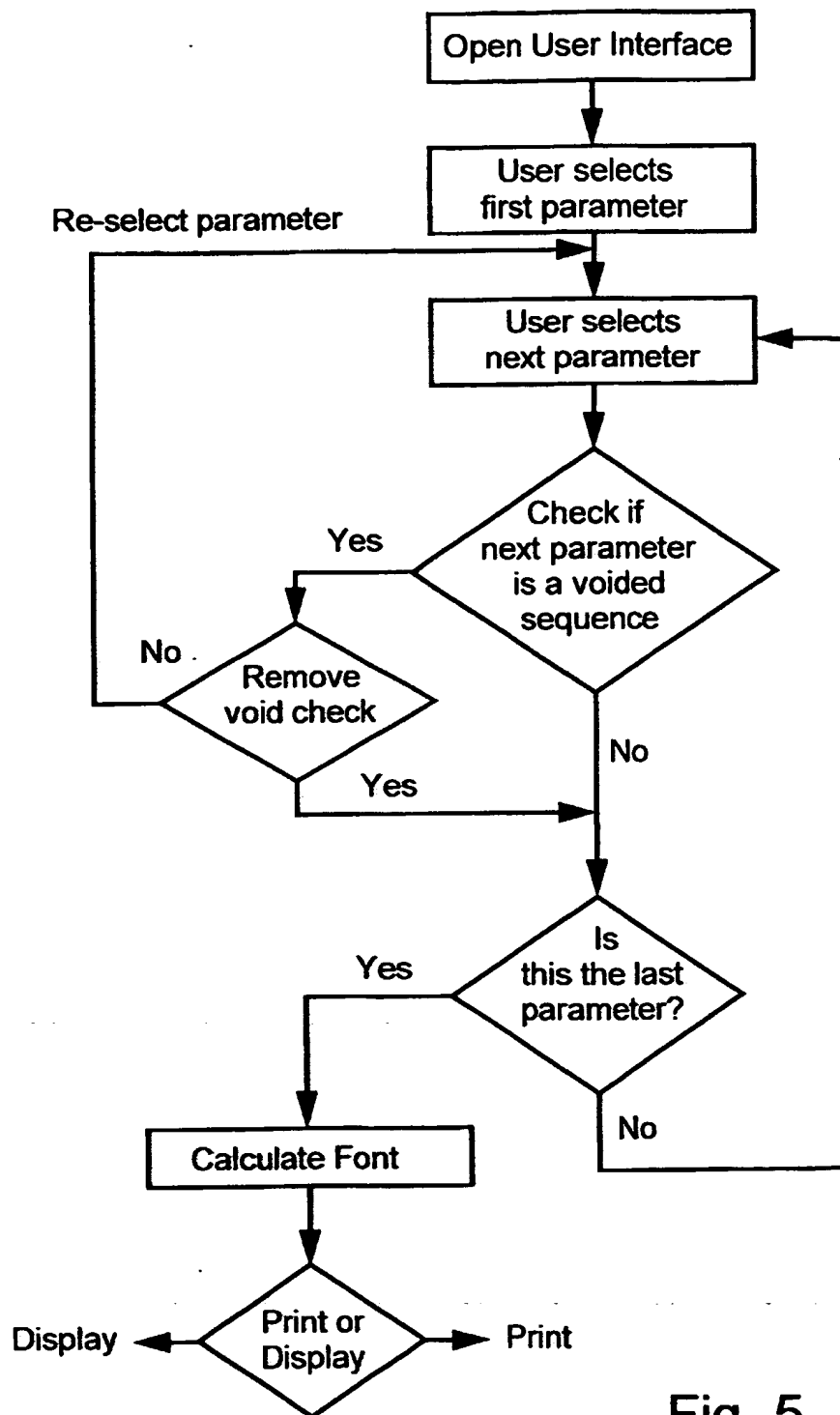
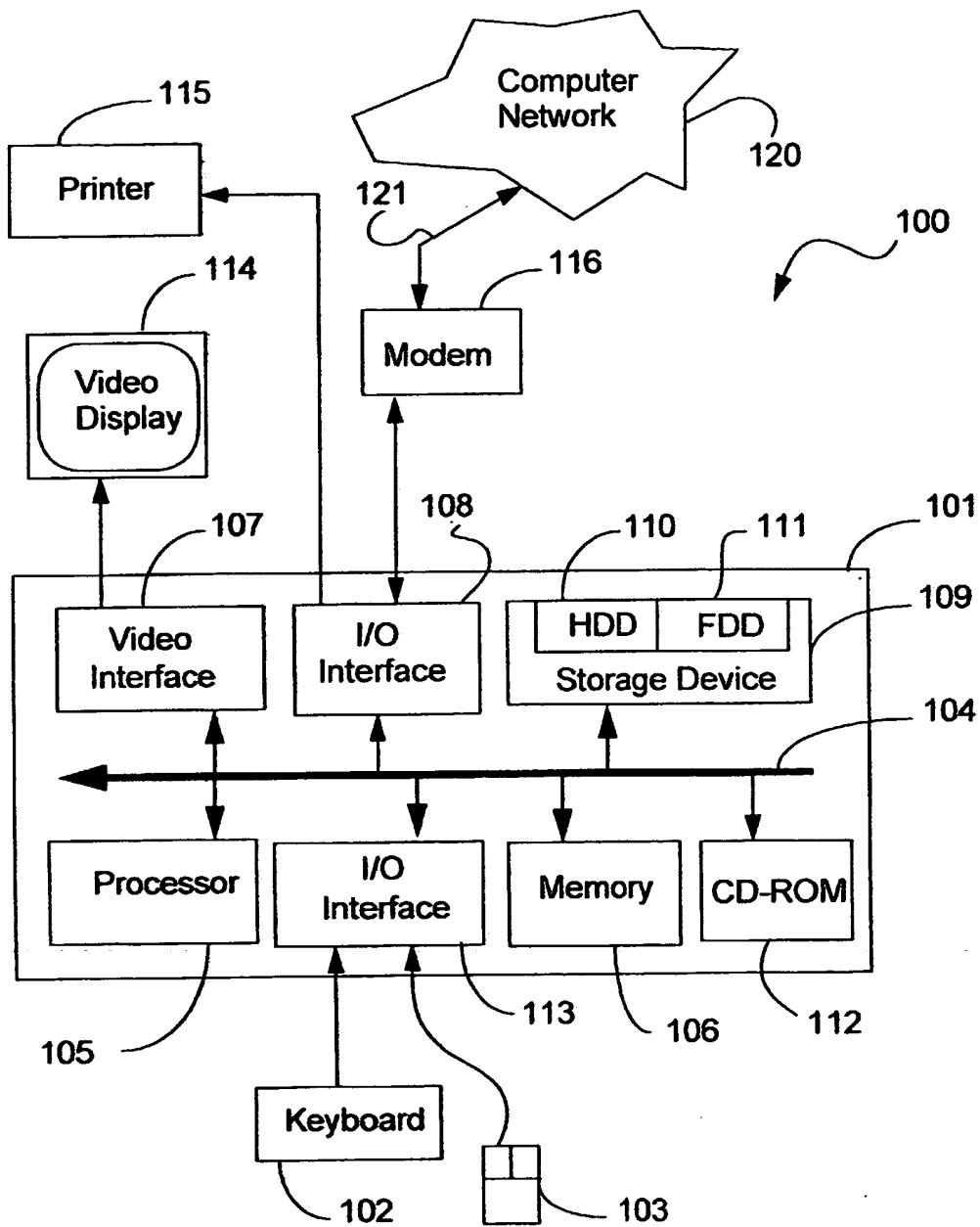


Fig. 5

**FIG. 6**